

MAINTENANCE ENGINEERING PROCEDURE



UNION CARBIDE CORPORATION

NUCLEAR DIVISION

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE 37830

Number MEP-342

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REMOVAL AND REPLACEMENT OF 42-INCH BLOCK VALVE

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G. F. Mc Bride / dw 12/1/2008
BJC ETTP Classification & Date
Information Control Office

A. SCOPE

This procedure describes the method used to remove and replace type G-17 42" block valves in K-33.

C. QUALITY ASSURANCE

The performance and reliability of the 42-inch block valve affects the operation of the cascade. Quality workmanship is extremely important during the installation of these valves. Give particular attention to the following critical items:

1. Welding

Failure to produce good quality, leak-tight welds causes considerable delays during leak acceptance tests. Faulty welds could result in (1) release of process gas to the atmosphere, (2) inleakage into the process system, (3) formation of a damaging corrosion product, and (4) cell off-stream time to repair the weld.

2. Equipment Preparation and Inspection

Block valve piping must be prepared and inspected as described in applicable drawings, specifications, and procedures. Failure to do so leads to schedule delays and failure to meet production commitments.

3. Rigging and Equipment Handling

Failure to properly rig a 42" block valve seriously endangers personnel or causes extensive damage to expensive cascade equipment. Personnel must have an approved license before operating a crane to handle block valves (MEP-302, "Certification of Industrial Equipment Operators.")

4. Cleanliness

The presence of foreign materials in the process pipe system results in damage to cascade equipment. Consequently, this piping must be clean and free of oil, grease, dirt, weld slag, and loose scale to meet cascade operating requirements.

5. Maintenance

Failure to properly set the limitorque control affects the closure torque and the pressure applied to the valve seats.

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6. Quality Control Documentation

Complete Form UCN-12636 "Process Block Valve - Field Data" for each block valve change.

8. SAFETY REQUIREMENTS

A Safety Work Permit (UCN-3694B), and an Electrical Work Permit (UCN-513) are required. The General Safe Practices listed in the ORGDP Safety and Health Standards apply, with particular emphasis on the following:

1. Check location on Safety Work Permit and the Electrical Work Permit against job location.
2. Burning: Wear respirator and protective clothing.
3. Grinding: Wear respirator, safety goggles and protective face shield.
4. Lifting block valve with overhead crane:
 - a. Use siren when transferring valve.
 - b. Only qualified and licensed operator operates crane.
 - c. Use proper lifting fixture (refer to K-SS 6.2 Safety and Health Standard).
 - d. Inspect chokers and slings for broken strands.
 - e. Be extremely careful when handling valve.
 - f. Stay clear when valve is suspended.
5. Keep floors free of cables, slings, and other tripping hazards.
6. All personnel must be properly fitted with respirators.

D. RESPONSIBILITIES

A. Field Maintenance, Routine Maintenance Personnel

- a. Confers with the Maintenance Engineering Services section representative on input information used in the Computerized Equipment Information System (CEIS).
- b. Removes and installs block valves.
- c. Changes the seats in the existing modified outlet valves and reinstalls these valves in the inlet position.

- d. Contacts Cascade Operations for cleaning service, if required.
- e. Fills out Process Block Valve - Field Data Report and forwards to distribution listed.
- f. Follows safety and industrial hygiene requirements.
- g. Makes sure all valves removed from the cascade are open (cracked) before shipping to either K-1420 or K-1401.
- h. Informs appropriate personnel both in K-1420 and K-1401 when shipping valve from the cascade.

2. Cascade Operations Personnel

- a. Purges the cell to a negative UF_6 concentration.
- b. Furnishes Field Maintenance with electrical and safety work permits.
- c. Witnesses all static leak rate tests.
- d. Contacts Health Physics for consultation, advice, and placement of signed and dated Radiation Contamination tag on block valve scheduled for removal.
- e. Contacts Chemical Operations group for decontamination service.

3. Chemical Operations Personnel

- a. Cleans excessive product material from cell piping and block valves, especially flanges.
- b. Notifies Cascade Operations and Field Maintenance after cleaning operation.

4. Health Physics Personnel

- a. Consults with Field Maintenance on safe working limits for their employees.
- b. Places signed and dated Radiation Contamination tags on block valve removed from the cascade.

5. Equipment, Test, and Inspection (ET&I)

- a. Monitors and inspects the quality of all weld preparation, fit ups and welding, including repair welds.
- b. Inspects the inside of block valves and pipe openings to assure that no foreign material is present.

- C. Forwards welding inspection reports to Operations Engineering, Field Maintenance, and Maintenance Engineering.

E. GENERAL INFORMATION

- A. The 42" block valve isolates a portion of the cascade piping system for operational purposes. Because the valve(s) throttles during the charging or evacuation of a cell, it helps control gas flow.
- B. The block valves are Type G-17, rising stem, double-disc gate valves. A wedge and spreader assembly closes the valve discs. Plastic seats are used in the valves. The valve can be operated both manually or mechanically.
- C. Problems which have been encountered with the valve include HANG UP of the valve discs or spreader assembly, valve seat leaks, bellows rupture, motor failure, and mechanical failure of the stem and wedge, which causes the valve not to close.
- D. If any valve fails in operation it can cause disturbances in the gas flow. This can result in compressor surging and, in extreme cases, compressor deblading.
- E. The existing modified 42" outlet valves in K-33 are moved to the inlet positions (after seats have been changed) and barber-pole type inlet valves are uprated and installed in the outlet positions.
- F. Process Block Valves - Field Data Cards are used to record pertinent information about the changeout and location of valve.

TOOLS, EQUIPMENT, AND MATERIAL

<u>NO.</u>	<u>ITEMS</u>
1	42-inch block valve sling
2	Oxyacetylene scarfing rigs
12	"C" clamps, No. 3
1	Vacuum cleaner
20	Asbestos cloth
2	Disc grinders
2	Sledge hammer, 8-lb.

<u>NO.</u>	<u>ITEMS</u>
2	Pipe cutters
2	Two-ton Come-A-Longs
2	Valve stands

F. PROCEDURES

A. Preparation

NOTE: Cascade Operations personnel purges the cell to a negative pressure before work permits are issued.

- a. Obtain work permits from Cascade Operations before starting a block-valve change.
- b. Set up the equipment listed in the procedure.
3. Record the following information on the Process Block Valve - Field Data Report (Fig. 1).
 - a) Building
 - b) Unit
 - c) Cell
 - d) Type Configuration (Position)

PROCESS BLOCK VALVE-FIELD DATA		
	<input type="checkbox"/> 42" <input type="checkbox"/> 30"	
001 BONNET NO.	<input type="text"/>	12AN
004 BUILDING	<input type="text"/>	5AN
005 UNIT	<input type="text"/>	1N
006 CELL	<input type="text"/>	2N
010 SERIAL NO. (BODY NO.)	<input type="text"/>	12AN
011 PROPERTY NO.	<input type="text"/>	6AN
012 TYPE CONFIGURATION (POSITION)	<input type="text"/>	20AN
013 DATE INSTALLED	<input type="text"/>	6N
014 DATE REMOVED	<input type="text"/>	6N
040 REASON FOR REMOVAL RE - Relocate UP - Uprate FO - Failed to Operate	<input type="text"/>	3AN
COMMENTS: _____		
Supervisor: _____ Date: _____		
DISTRIBUTION: CASCADE OPERATIONS - 303 MAINTENANCE ENGINEERING - 208 OPERATION ENGINEERING - 327 FIELD MAINTENANCE - RC		

UCN-12636 (1 6-77)

FIG. 1 BLOCK VALVE FIELD REPORT

- a. Remove bolts from side panel adjacent to block valve and remove side panel.
- b. Select one of the operations below depending on location of block valve.
 - a) If valve is at cell 1 and 2, (Fig. 2).
 - a) Remove chain from guard rail.
 - b) Scarf out the frame work.

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(U)

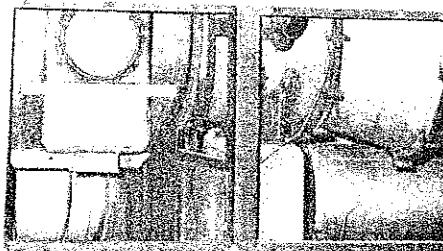
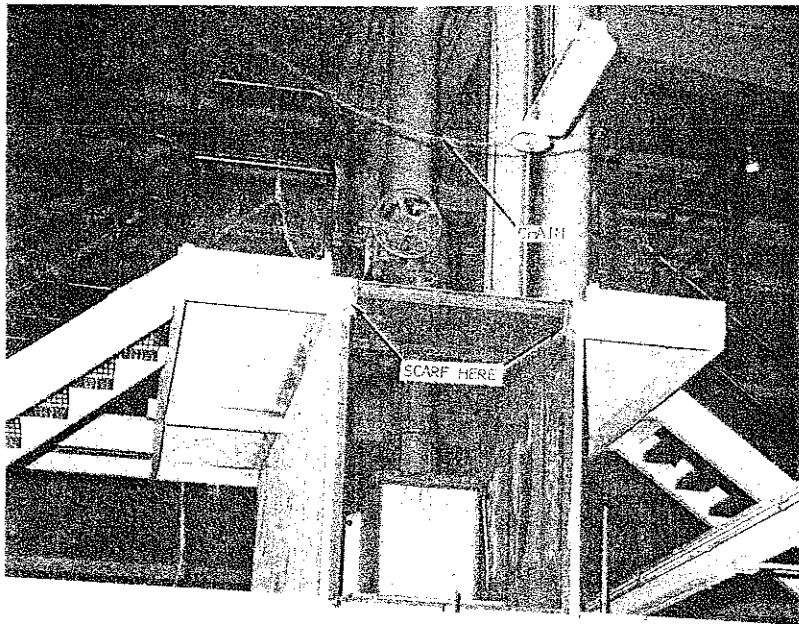


FIG. 2 VALVE AT CELL 1 AND 2

- b) If valve is at inlet or outlet position (Fig. 3):
 - a) Remove guard rail.
 - b) Remove transite from behind air duct.
 - c) Use balance beam and side collar when changing (AB) valve.

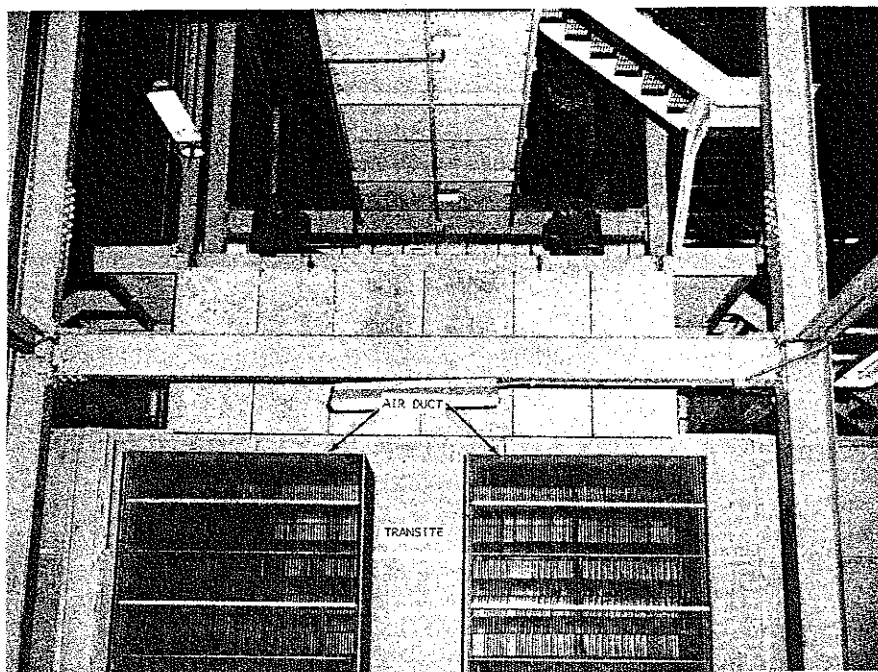


FIG. 3 INLET - OUTLET POSITION

- 3) If valve is at the A-line bypass position, except for cells 1 and 2:
 - a) Remove building brace (3" angle iron), sprinkler line and valve housing (Fig. 4).
 - b) Remove valve stem cover, catwalk platform, and steam line (Fig. 5).
 - c) Position valve cart directly under block valve to be removed (Fig. 6).

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FIG. 4 A-LINE BYPASS

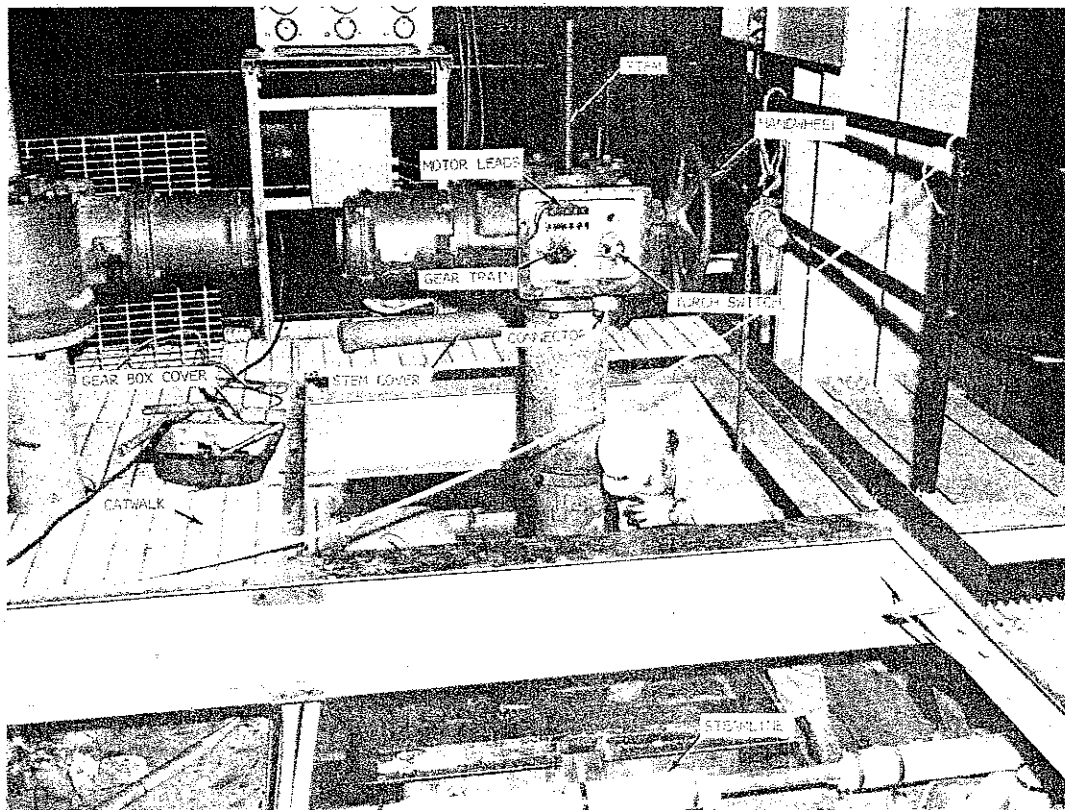


FIG. 5 A-LINE BYPASS

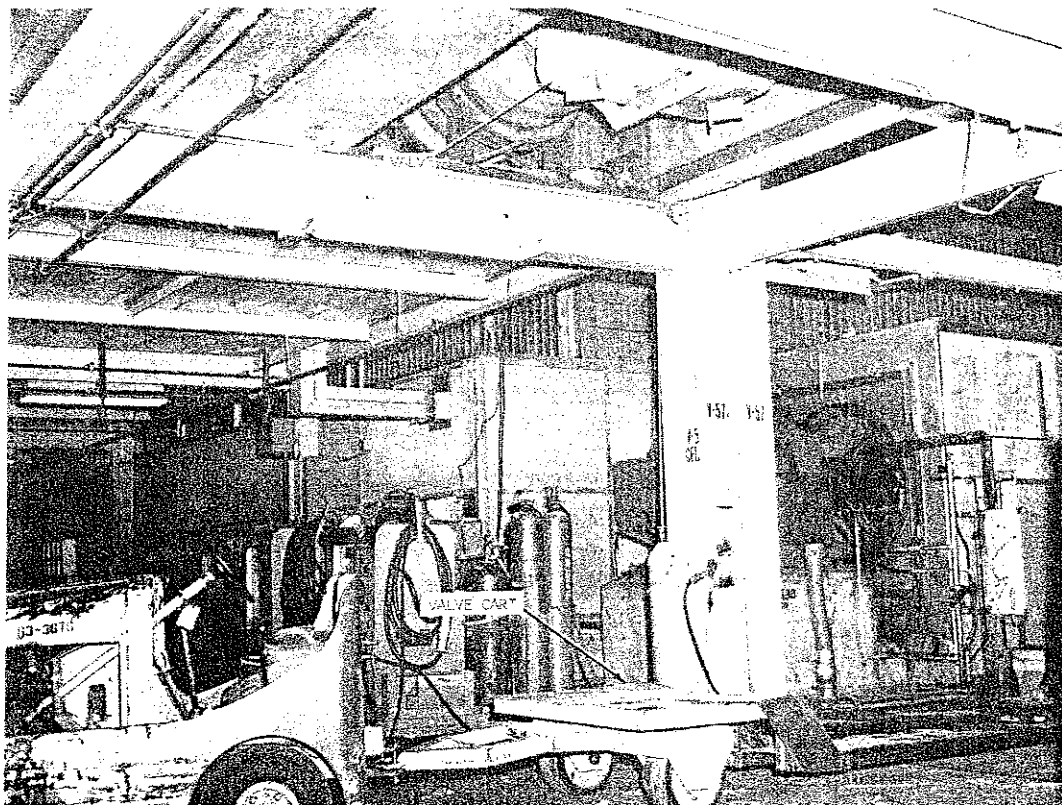


FIG. 6 A-LINE BYPASS

2. Removal of Block Valve

- a. Make sure the valve is open (cracked).
- b. Remove the stem cover.
- c. Check the orientation of the motor operator.

NOTE: To use the block valve sling, the motor operator must be perpendicular to the gas flow. If the motor operator is not properly aligned, rotate motor operator 90° after the motor operator has been disconnected.

- d. Remove hatch cover over 42" block valve with lifting fixture attached to the overhead crane (Fig. 7).

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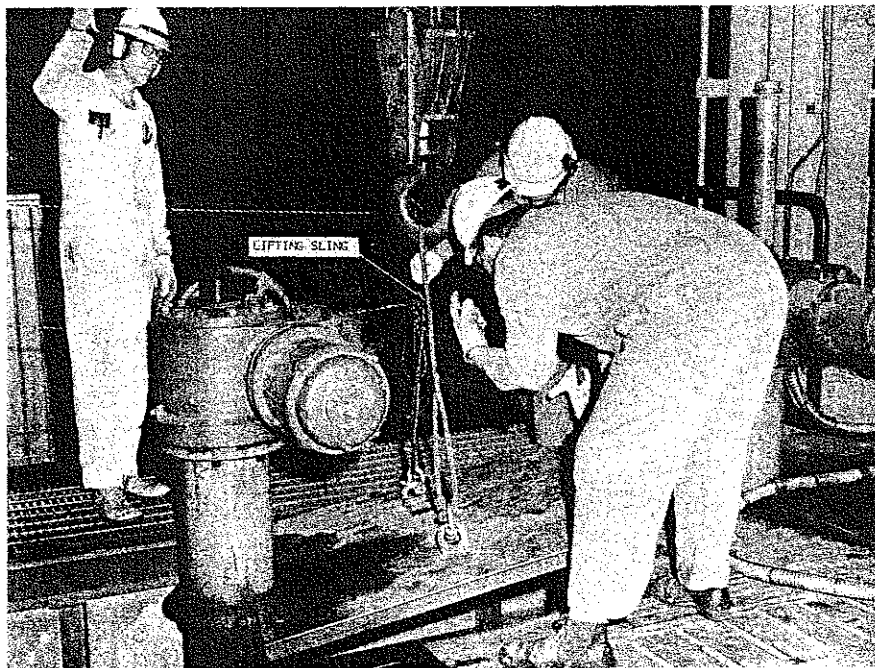


FIG. 7 HATCH COVER

- e. Cut the 1/2-inch monel purge line with a pipe cutter (Fig. 8).
 - f. Connect arc welding machine to 480 volt transformer wagon; then connect wagon to a building outlet (200-amp service). Each welding machine must have enough cable for welder to move around freely without obstruction.
 - g. Separate block valve from PG piping by scarfing the flange welds (Fig. 9).
- CAUTION: Exercise extreme care during the final cut, and wear respirator.

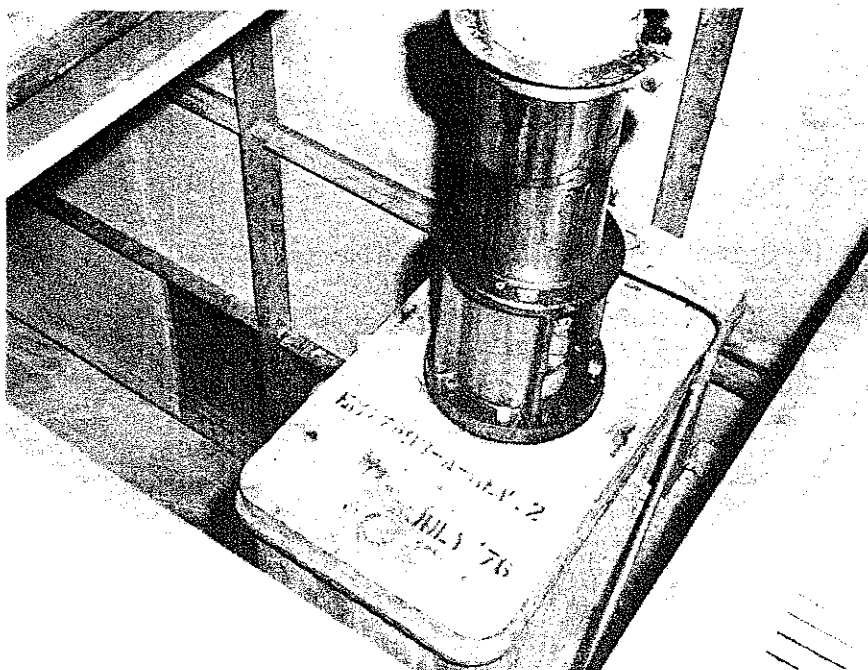


FIG. 8 PURGE LINE

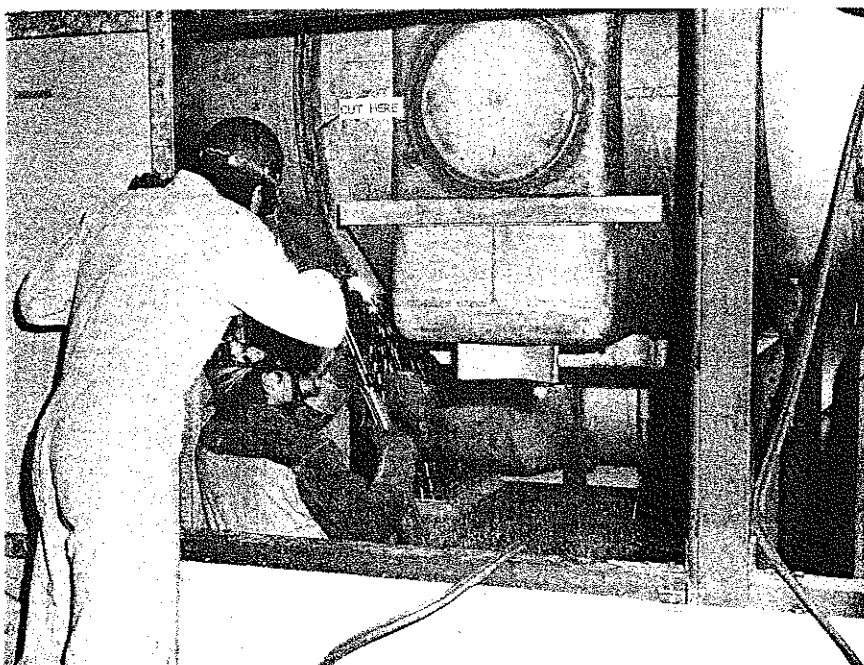


FIG. 9 SCARFING OPERATION

18. Tighten the expansion joint bolts to provide clearance between the PG line and the valve. Then raise the valve with the bay crane until it clears the plate on the valve platform. Keep the valve level while raising it clear of the PG line (Fig. 10).

IMPORTANT: Do not over tighten bolts. This can result in damage to bellows.

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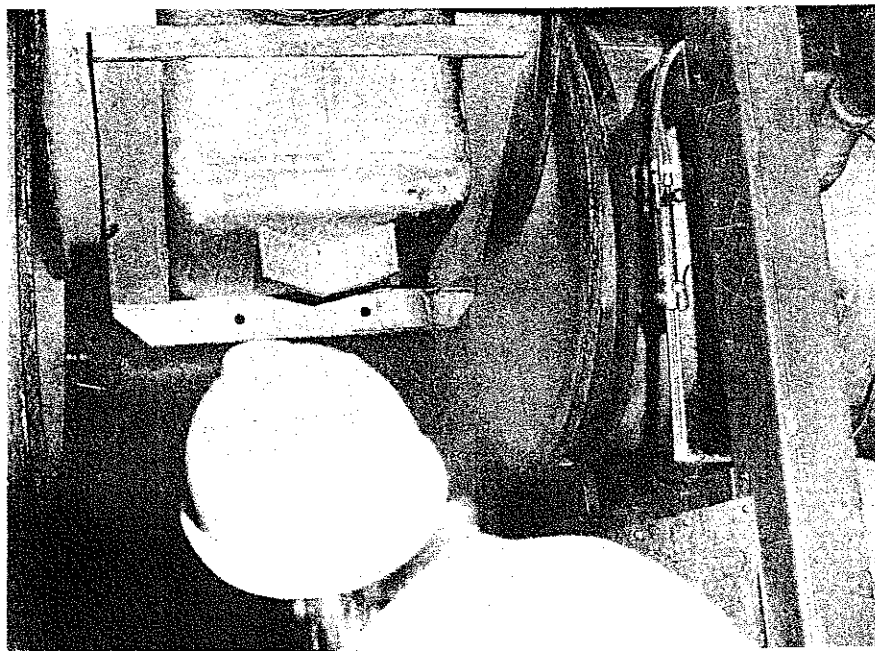


FIG. 10 CLEAR PG LINE

9. Move the block valve to an open area behind the cell (Fig. 11).

NOTE: It may be necessary to use the balance beam to transfer valve to cell floor (Fig. 12).

10. Install shower cap over block valve openings. If necessary, secure shower caps in place with masking tape.
11. Record the following information requested on the Process Block Valve-Field Data Card:
- a) Bonnet, Serial (Body) Number, and Property Number of the valve removed.
 - b) Reason for removal and record date block valve removed.
12. Have the valve transported to K-1420 for complete decontamination.

IMPORTANT: Make sure valve remains in the open (cracked) position.

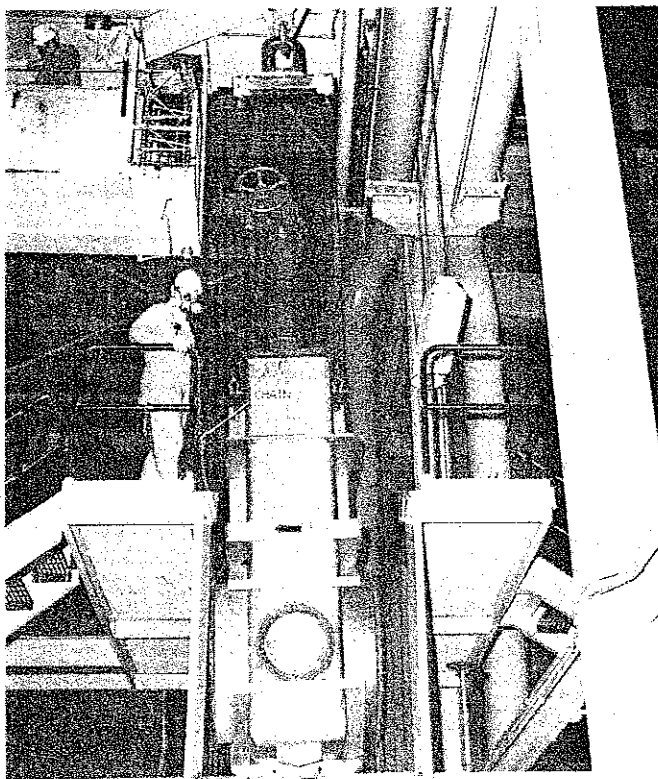


FIG. 11 REMOVAL OF VALVE

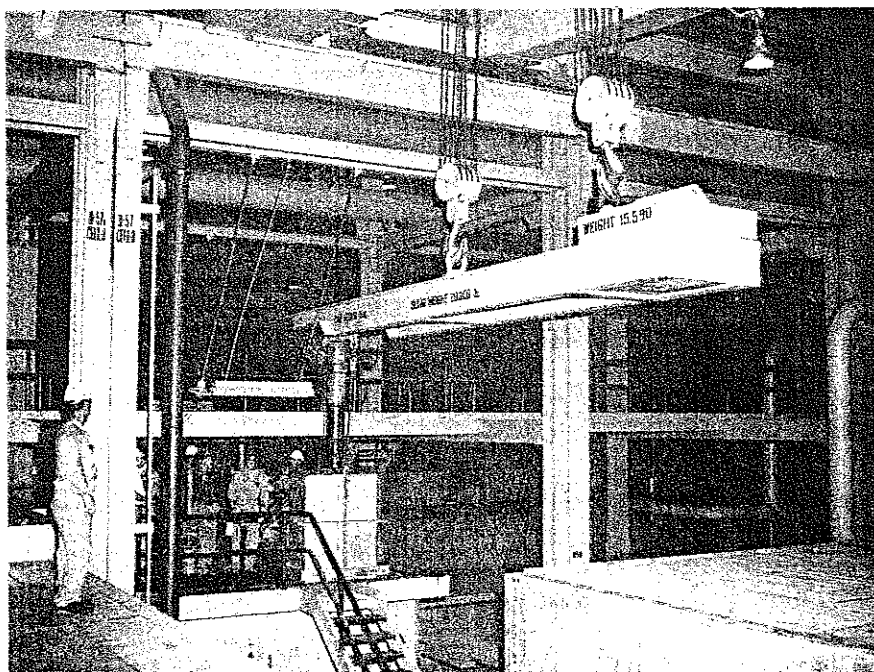


FIG. 12 USING BALANCE BEAM

C. Recondition of PG Line

1. Decontaminate PG flanges (Chemical Operations personnel-Fig. 13).
2. Bevel edge of flanges for welding (UCN W-103).
3. Grind face of flanges and remove approximately 1/2" of nickel plating from rim.

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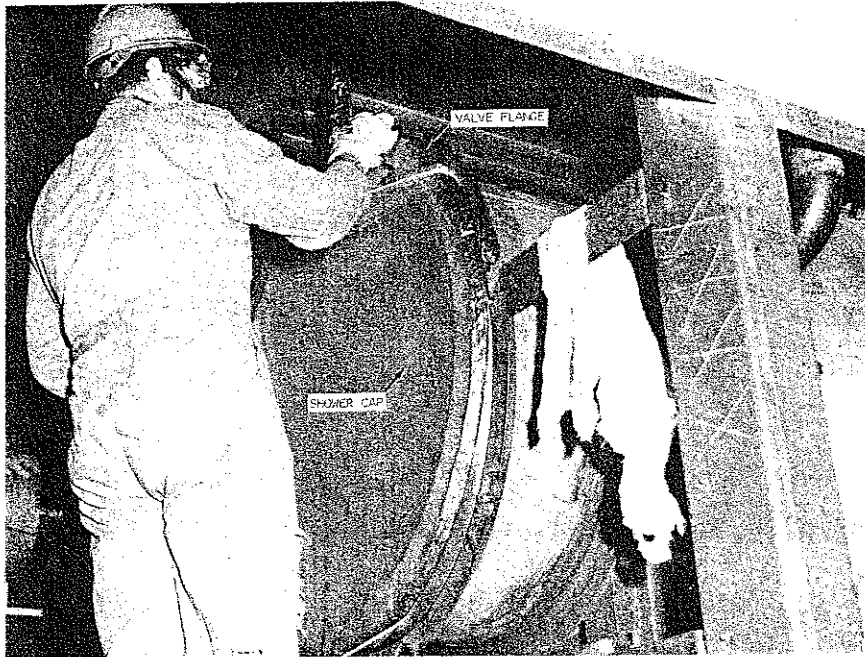


FIG. 13 CLEANING OPERATION

4. Vacuum the grinding dust from flanges and the PG pipe interior (Chemical Operations personnel).

CAUTION: Wear respirator and goggles during grinding and vacuum operation.

D. Preparation and Inspection for Installation - (Fig. 14)

1. Remove shower caps from the block valve and visually check interior to make certain it is free of foreign material.
2. Attach block valve to overhead crane with special lifting fixture.
3. Move block valve from cell floor to position where it is to be installed.

E. Installation - (Fig. 15)

1. Lower the valve carefully into position between the PG piping flanges.
2. Loosen the expansion joint bolts. This allows the expansion joint to expand and to press against valve flange.

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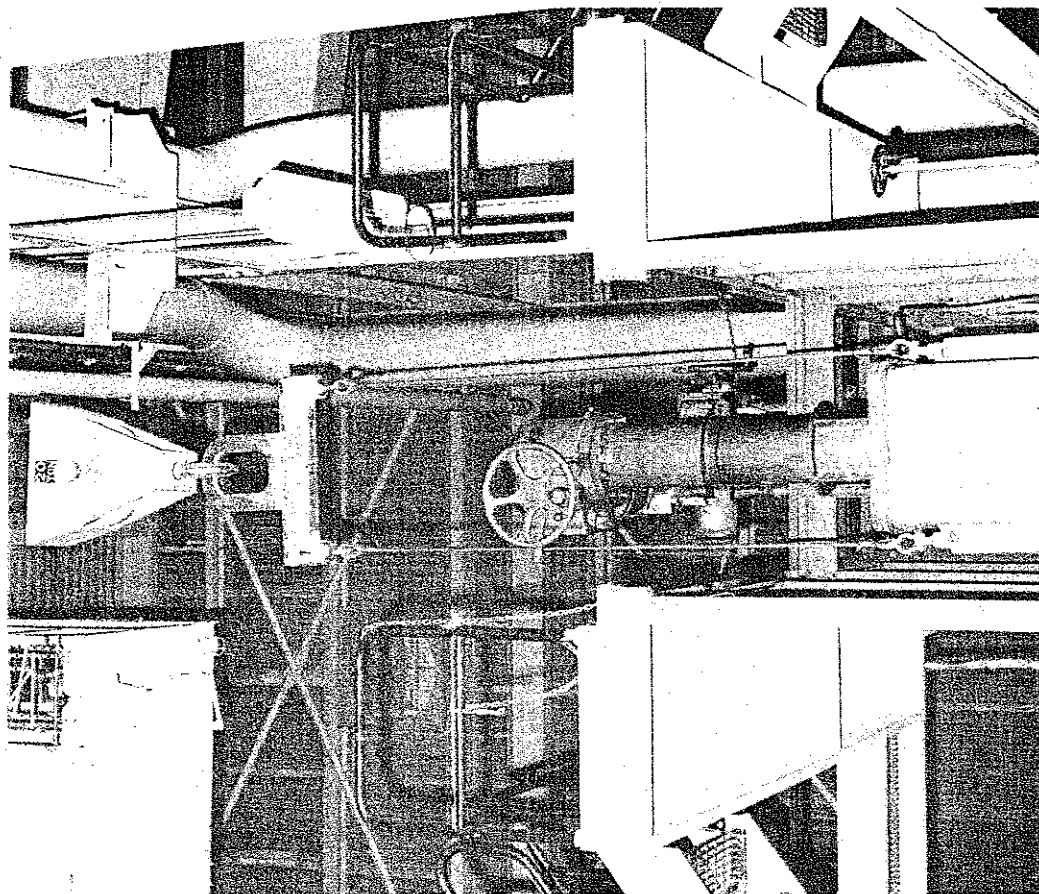


FIG. 15 VALVE INSTALLATION

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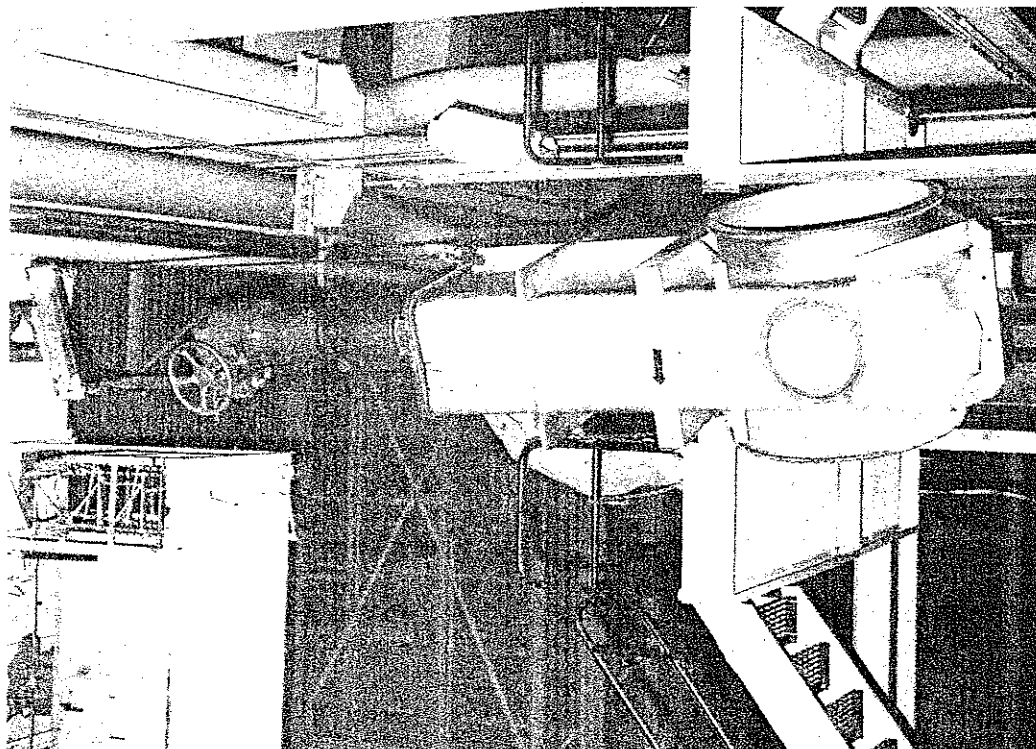


FIG. 14 LIFTING VALVE

3. Install six No. 3 "C" clamps on the pipe and valve flange on each side of the valve.
4. Align block valve to the PG piping. Notify ET&I of anticipated welding.
5. Welding (Fig. 16)

1. Tack weld each of the flanges with five equally spaced 5-inch welds. ET&I inspects and approves joint preparation and fit up.

CAUTION: Wear respirator and goggles during the welding operation.

2. Remove the "C" clamps and weld the flanges (UCN W-103). ET&I inspects acceptability of root pass.
3. Remove slag from weld with a wire brush to assure good leak test.
4. Each welder stencils each joint. ET&I inspects acceptability of second or cover pass.
5. Disconnect the rigging from the overhead crane.
6. Weld the monel purge line (UCN W-406). ET&I inspects acceptability of purge line weld.

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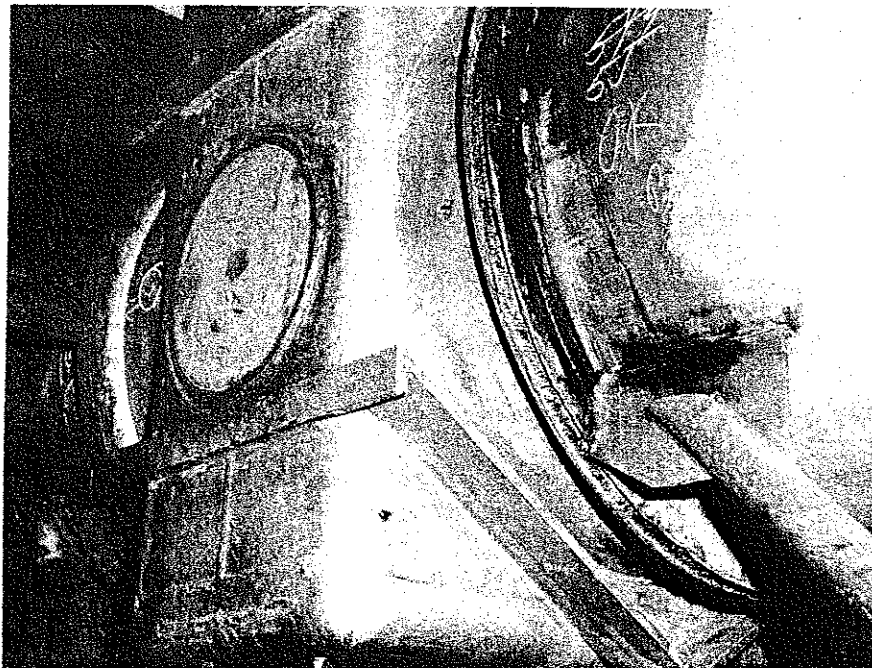


FIG. 16 WELDING

4. Setting the Limitorque (Fig. 5)

1. Check breaker and contactor in control center for improper wiring or faulted equipment.
2. If all wiring and components appear to be in order, turn off breaker and rack out.
3. Move motor operated valve test buggy to valve location and perform the following:
 - a) Remove valve motor leads.
 - b) Install test motor leads.
 - c) Install (clip on) test torque switch leads.
 - d) Manually crank valve until stem appears above housing.
4. Energize test buggy and momentarily engage close button to ensure proper rotation.

NOTE: If rotation is correct, again close button and manually activate torque switch to ensure proper operation.

5. If torque switch operates properly, again engage close button making the following observations:
 - a) That limit switch drive pinion is engaged and functioning.
 - b) That contact rotor on the side away from motor operates as valve is seating.

NOTE: If not, reset as described in Step 8.

6. That torque switch activates before motor overloads or heaters trip.
6. Set dial for torque switch at 1.00.
7. With torque wrench manually unseat valve to determine the torque. Check torque reading against 1.00 (90 - 95 ft. lbs.) and adjust as required. Repeat Steps 5, 6, and 7 if torque setting is changed.
8. Once torque setting is verified, check or reset close contact (red light) rotor on side away from motor as follows:
 - a) From fully-closed position, open valve seven turns with hand wheel.
 - b) Remove Allen cap screw between the gear shaft rotors and declutch the drive pinion by inserting the brass setting rod.

- 3) Turn the close gear shaft (side away from motor) counter-clock-wise until the rotor breaks contact.
- 4) Remove setting rod and re-engage drive pinion.
9. Using the motor, open the valve to within a few inches of the fully-open position. Declutch motor and continue to open valve manually to full-open (back seated) position.
10. Manually close 42" block valve so that the stem moves downward 1-inch.
11. With the valve in this position, make sure contact rotor (upper limit and green light) nearest the motor is open. If not, adjust as follows:
 - a) Disengage drive pinion as in Step 8a.
 - b) Turn the gear shaft nearest motor clockwise until rotor breaks contact.
 - 3) Remove setting rod as in Step 8d.
12. Return valve wiring to normal (deenergize test buggy).
13. Hand crank valve until stem is several inches away from full-open.
14. Rack valve in and have Cascade Operations bump valve to ensure proper rotation.
15. Have Cascade Operations to operate valve in a normal manner at least three complete cycles to ensure proper lights and control. Valve should be stopped and hand-wheel engaged at least twice during each cycle to ensure proper operation of automatic declutching of hand wheel. Make proper adjustments if required.
16. If any abnormal noises or action are found during this procedure, describe findings on the Process Block Valve - Field Data Report in the comment section.
8. Miscellaneous
 4. Record the following information on the Process Block Valve - Field Data Report (Fig. 1).
 - a) Bonnet Number
 - b) Building
 - 3) Unit
 - 4) Cell
 - 5) Serial Number (Body Number)

- h) Type Configuration (Position)
 - i) Date Installed
 - j) Comments
 - k) Supervisor's Signature
12. Release Safety Work Permit to Operations.
 13. Notify Cascade Operations personnel that the block valve installation is complete. Request Operations to pressure test each weld for leaks.
 14. Complete and release remaining work permits.
 15. Repair leaks as requested by Operations Division personnel. ET&I inspects repair method and repair quality and submits copies of Quality Control Report to Cascade Maintenance, Operations Engineering and Maintenance Engineering.
 16. Replace all stairways, hatches, and handrails that were removed.
 17. Remove tools, equipment, and material, and notify Operations that block valve is ready for Operations.
 18. Clean up the area in and around the cell and replace bolted doors.
 19. Supervisor-in-charge signs the Process Block Valve - Field Data Report and forwards one copy each to Cascade Operations, Maintenance Engineering, Operations Engineering and keeps record copy.